

REMARKS

Applicants have studied the Office Action dated August 18, 2005 and have made amendments to the claims. It is submitted that the application, as amended, is in condition for allowance. Claims 6-13 are pending. Claims 6, 10 and 12 have been amended to correct minor informalities. The specification has been amended to correct minor informalities. No new matter has been added. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks are respectfully requested.

The Examiner stated that Applicants have not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. § 120.

In the "Request for Filing a Divisional Application" filed with the present application, Applicants requested that the specification be amended by inserting before the first line the following: "This is a divisional of application Serial No. 10/044,286, filed January 11, 2002, now U.S. Patent No. _____. The entire disclosure of prior application Serial No. 10/044,286 is herein incorporated by reference." Thus, the specification was amended to contain a specific reference to the prior application in the first sentence of the specification. However, for the sake of clarity, Applicants are herein specifically amending the specification to contain a specific reference to the prior application in the first sentence of the specification. Therefore, it is submitted that Applicants have complied with all conditions for receiving the benefit of an earlier filing date under 35 U.S.C. § 120.

The title of the invention was objected to as not being descriptive. Applicants have amended the title of the application so as to be indicative of the invention to which the claims are directed.

Claims 6-10 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hammerl et al., (U.S. Patent No. 5,543,348) in view of Thapar (U.S. Patent No. 6,580,123) and ITDB 1988. This rejection is respectfully traversed.

A preferred embodiment of the present invention is directed to a method for fabricating an integrated circuit that includes a substrate that incorporates a semiconductor photodiode device having a p-n junction. According to the method, there is produced an initial single-crystal substrate having locally a capacitive trench emerging at the surface of the initial substrate and forming a discontinuity in the crystal lattice. The initial substrate is recessed at the trench to form a recess, and the crystal lattice is amorphized around the periphery of the recess. A layer of amorphous material having the same chemical composition as the initial substrate is deposited, and a thermal annealing is performed in order to recrystallize the amorphous material so as to be continuous with the single-crystal lattice of the initial substrate. An upper substrate layer is grown epitaxially.

Thapar disclosed a fabrication process in which a heavy dose implant of a neutral species is applied to the bottom of the trench only, converting the single crystal silicon at the trench bottom to an amorphized silicon. Thereafter, an oxide is grown on the single crystal trench walls and on the amorphized bottom trench surface. The oxide on the amorphized silicon grows about three to four times faster than on the trench walls.

The Examiner has taken the position that "it would have been obvious to a person of ordinary skill in the art at the time of invention to amorphize around a recess as taught by Thapar, in the process of Hammerl, to increase the rate of oxide growth".

However, in embodiments of the present invention, the aim is not to achieve an oxide growth step, but to deposit an amorphous material having the same chemical composition as the initial substrate. The fourth step of independent claim 6 recites:

“depositing a layer of amorphous material having the same chemical composition as the initial substrate.”

Thapar does not teach or suggest that the disclosed fabrication process also works with a material having the same chemical composition as the initial substrate.

Moreover, Hammerl states that, "because the crystalline silicon substrate acts as a seed of recrystallization, a native oxide in between second conductive region 107 and the amorphous silicon layer 108 is not acceptable. Therefore, the in-situ removal of the native oxide prior to deposition . . . is important". See Hammerl at column 5, lines 17 to 21. Thus, it is not possible to apply the teaching of Thapar to the process disclosed by Hammerl as suggested by the Examiner.

Thapar does not perform a thermal annealing, and does not teach or suggest to a person of ordinary skill in the art that it is possible to recrystallize an amorphous deposit on a partially amorphized substrate. It is all the less obvious because Hammerl also states that the recrystallization starts at the interface of the amorphous silicon layer 108 and the substrate. See Hammerl at column 5, lines 17 to 21. Therefore, the Examiner's combination of references does not make it obvious to amorphize the substrate. In fact, amorphizing the substrate appears to be contrary to the teaching of Hammerl. Therefore, the teachings of these two references would not lead a person of ordinary skill in the art to combine them; and even if the teachings were combined, the claimed invention would not result therefrom.

Claims 7-10 and 13 depend upon independent claim 6, and because dependent claims recite all the limitations of the independent claim, it is believed that dependent claims 7-10 and 13 are also allowable.

Therefore, it is respectfully submitted that the rejections of claims 6-10 and 13 under 35 U.S.C. §103(a) should be withdrawn.

Claims 11 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hammerl et al. in view of Thapar, ITDB 1988, and Chi et al. (U.S. Patent No. 6,171,923). This rejection is respectfully traversed.

Claims 11 and 12 depend from independent claim 6 (via intervening claim 10), and because dependent claims contain all the limitations of the independent claims, claims 11 and 12 should also be allowable over the art of record.

Therefore, it is respectfully requested that the rejections of claims 11 and 12 under 35 U.S.C. §103(a) be withdrawn.

In view of the foregoing, it is respectfully submitted that the application and the claims are in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is invited to call the undersigned attorney at (561) 989-9811 should the Examiner believe a telephone interview would advance the prosecution of the application.

Respectfully submitted,

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